CLAIMS

1. A broad band cholesteric liquid crystal film comprising: a cholesteric liquid crystal film obtained by coating a liquid crystal mixture containing a polymerizable mesogen compound (a), a polymerizable chiral agent (b) and a photoisomerizable material (c) on a substrate to ultraviolet polymerize thereof, having a reflection bandwidth of 200 nm or more.

2 The broad band cholesteric liquid crystal film according to claim 1, wherein a pitch length in the cholesteric liquid crystal film changes continuously.

3. The broad band cholesteric liquid crystal film according to claim 1 or 2, wherein the liquid crystal mixture comprising a photopolymerization initiator (d).

4. The broad band cholesteric liquid crystal film according to any one of claims 1 to 3, wherein the polymerizable mesogen compound (a) has one, or two or more of polymerizable functional groups, the polymerizable chiral agent (b) has one, or two or more polymerizable functional groups.

5. The broad band cholesteric liquid crystal film according to any one of claims 1 to 4, wherein the photoisomerizable

material (c) is at least one kind selected from the group consisting of stilbene, azobenzene and a derivative thereof.

6. A manufacturing method for the broad band cholesteric liquid crystal film according to any one of claims 1 to 5 comprising steps of: coating a liquid crystal mixture containing a polymerizable mesogen compound (a), a polymerizable chiral agent (b) and a photoisomerizable material (c) on a substrate and ultraviolet polymerizing thereof.

7. A circularly polarizing plate comprising the broad band cholesteric liquid crystal film according to any one of claims 1 to 5.

8. A linearly polarizer comprising the circularly polarizing plate according to claim 7 and a λ/4 plate laminating on the circularly polarizing plate.

9. The linearly polarizer according to claim 8, the circularly polarizing plate, which is the cholesteric liquid crystal film, is laminating on the λ/4 plate so that a pitch length in the film is narrowed toward the λ/4 plate continuously.

10. A linearly polarizer comprising an absorption polarizer adhering to the linearly polarizer according to claim 8 or 9 so that

a transmission axis direction of the absorption polarizer and a transmission axis of the linearly polarizer are arranged in parallel with each other.

11. A luminaire comprising the circularly polarizing plate according to claim 7 or the linearly polarizer according to any one of claims of 8 to 10 on a front surface side of a surface light source having a reflective layer on the back surface side thereof.

12. A liquid crystal display comprising a liquid crystal cell in a light emitting side of the luminaire according to claim 11.

13. A polarizing element system comprising: a retardation layer (b) having a front face retardation (in the normal direction) of almost zero and a retardation of $\lambda/8$ or more relative to incident light incoming at an angle of 30° or more inclined from the normal direction is arranged between at least two layers of a reflection polarizer (a) having respective selective reflection wavelength bands of polarized light superimposed on each other,

wherein the reflection polarizer (a) is the circularly polarizing plate according to claim 7.

14. The polarizing element system according to claim 13, wherein a selective reflection wavelength of the at least two layers of the reflection polarizer (a) is superimposed on each other in the

wavelength range 550 nm ± 10 nm.

15. The polarizing element system according to claim 13 or 14, wherein the retardation layer (b) is a layer comprising a cholesteric liquid crystal phase having a selective reflection wavelength band other than the visible light region fixed in planar alignment.

16. The polarizing element system according to claim 13 or 14, wherein the retardation layer (b) is a layer comprising a rod-like liquid crystal fixed in homeotropic alignment state .

17. The polarizing element system according to claim 13 or 14, wherein the retardation layer (b) is a layer comprising a discotic liquid crystal fixed in nematic phase or columnar phase alignment state.

18. The polarizing element system according to claim 13 or 14, wherein the retardation layer (b) is a layer comprising a biaxially orienting polymer film.

19. The polarizing element system according to claim 13 or 14, wherein the retardation layer (b) is a layer comprising an inorganic layered compound with negative uniaxiality fixed in alignment state where an optical axis thereof is a normal direction

of a surface thereof.

20. A wide viewing angle liquid crystal display comprising at least:

a backlight system containing a polarizing element system according to any one of claims 13 to 19 to collimate a light from a diffuse light source;

a liquid cell transmitting collimated light;

a polarizing plate arranged on both sides of the liquid cell; and

a viewing angle magnification film, which diffusing transmitted light, arranged on a viewer side of the liquid cell.

21. The wide viewing angle liquid crystal display according to claim 20, wherein a $\lambda/4$ plate is arranged on the viewer side (the liquid cell side) of the polarizing element system according to any one of claims 13 to 19 so that an axial direction of linearly polarized light transmitted and a transmission axis direction of a polarizing plate on the lower side (the light source side) of the liquid crystal display are arranged in parallel with each other.

22. The wide viewing angle liquid crystal display according to claim 20 or 21, wherein the viewing angle magnification film is a diffuse plate substantially having neither backscattering nor polarization cancellation.

23. The wide viewing angle liquid crystal display according to any one of claims 20 to 22, wherein an each layer is laminated with a translucent adhesive or a pressure sensitive adhesive.